



RESEARCH ARTICLE

RELATIONSHIP BETWEEN THE COVID 19 SEVERITY AND ORAL HEALTH STATUS: A CROSS SECTIONAL STUDY

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Abstract

Introduction. There are a number of respiratory pathogens in our oral cavity that makes this site for the cause of various infections. Various studies have been conducted in which the relation between oral hygiene and inflammatory conditions were investigated. Moreover Covid 19 is also related with the inflammatory response keeping that thing in mind we conducted this study to find out the relationship between covid 19 severity and oral health status.

Methods. A cross sectional study was conducted in 304 patients confirmed by real time PCR. In this study the questionnaire consisting of two parts one for covid 19 severity and other for oral health status was used.

Results. In this study it was found that there is an inverse correlation between the oral health status and covid 19 severity with ($p < 0.001$, $r = -0.512$).

Conclusion. In this study there was a significant relation between poor oral hygiene and severity of the covid 19. But more research is required to find out this relationship.

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Introduction:-

Covid 19 disease is caused by SARS-CoV-2 and was declared pandemic in 11 March 2020 by WHO¹. Covid 19 was associated with number of symptoms like fever, fatigue, dry cough, muscle pain etc². About 40-50% of mortality was found in ARDS cases. However in many cases mild symptoms were found but progression of severe pneumonia and multi organ failure leads to such mortality percentage³. Various risk factors were associated with covid 19 infection including CVS, immunodeficiency, diabetes, hypertension and ageing. Association between the oral health status and systemic diseases like CVS diseases, systemic infections, respiratory diseases have also been investigated⁴. About 700 bacterial species are found in the oral cavity and it has been found that various viral infection make the patients at the risk of secondary infection⁵. In case of Covid 19 case also the reports of super infection like mucormycosis were found. Various trials have been done to find out the relationship between viral load in the nasal and oral cavity and covid 19 severity.

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Studies were conducted in which the similarities between oral diseases like periodontitis and covid 19 were found like in case of covid 19 cytokine storm and to some extent similar cytokine response was found in case of periodontitis^{6,7}. Research also suggests that good oral hygiene and regular dental checkup reduce the progress of respiratory diseases to a greater extent. It was suggested that angiotensin-converting enzyme 2 (ACE2) may be the cause of increase in covid 19 severity, hence the severity of the covid 19 in case of oral disease like periodontitis can be justified by change in the cellular receptor response leading to the increased virulence of SARS-CoV-2⁸.

Although the oral diseases and covid 19 have been associated with many common comorbidities but the data available to suggest the association between covid 19 severity and oral health is very sparse. Hence this study was conducted to find out the effect of oral health on the severity of covid 19.

Table I:-

Relationship between the covid 19 severity and oral health status				
Oral health status		Covid 19 severity		P value
		Severe	Mild	
Good oral health	N	7	71	0.001<
	%	10	30	
fair oral health	N	21	145	
	%	25	64	
poor oral health	N	50	14	
	%	65	5	

Methodology:-

A cross sectional study with sample size of 304 on the covid 19 recovered subjects was conducted with 95% confidence limit and 5% confidence interval. Subjects included in this study were tested positive and records were taken from the hospital records. The questionnaire consisting of two parts was used for the assessment of oral health status and severity of covid 19. This whole procedure was done by phone calls and messaging to the included subjects. Subjects having the habits like smoking, alcoholics and obese, pregnant individuals were not included in the study. Age group selected was between 20-54 and both the genders with covid 19 positive report. Verbal as well as written consent was taken from the study subjects. Questionnaire used for this study was validated questionnaire used by Levin et al. (2013) and Prado et al.'s (2017) for evaluation oral health status. Assessment of relationship between covid 19 severity and oral health status was carried out by interpretation of both the sections of questionnaire. For oral health status scoring of 0-37 with higher scores denoting good oral health and according to these score subjects were classified into three groups: poor(0-14), fair(15-23) and good oral health(24-37). Covid 19 severity was evaluated by interpretation of questionnaire and accordingly subjects were grouped into mild and severe cases based on the criteria high respiratory rate (>30 breaths per minute); heart rate >100 beats/minute; severe dyspnoea or chest pain; oxygen saturation <93%; and high-grade fever (>39 °C).

Statistical analysis

Statistical analysis was by using SPSS 22. chi-squared test and unpaired t-test was used when comparing variables between the two groups. For correlation Spearman's correlation was used with p value <0.05 considered significant.

Result:-

In this survey it was found that incidence of severity of covid 19 reduced significantly with good oral health status as shown in table I and II and fig 1 with P value <0.001 and $r = -0.501$. First and second week comparison was found between the severity of covid 19 and oral health status and it was found that severity was found more among those with poor oral hygiene individuals than those with good oral hygiene as shown in the table III.

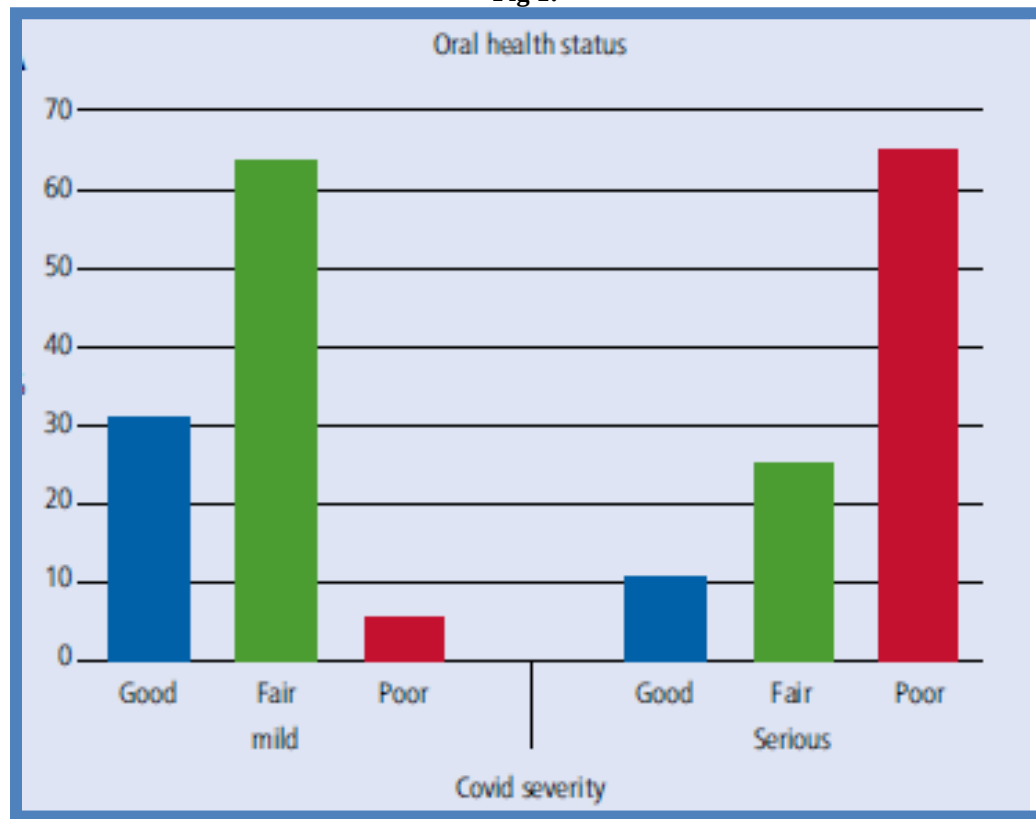
Table II:-

Correlations between oral health and COVID-19 severity			
Variables		Oral health status	Covid 19 severity
Oral health status	R	1	-0.501
	P Value	.	0.0
	N	304	304

Covid 19 severity	R	-0.501	1
	P value	0.0	.
	N	304	304

Table III:-

COVID-19 severity in first and second week with oral health status differences as p value <0.001					
Severe covid 19		Oral health status			P value
		Poor oral health	Fair oral health	Good oral health	
First week	N	11	6	3	<0.001
	%	63	25	10	
Second week	N	41	14	5	
	%	65	24.5	9.7	

Fig 1:-**Discussion:-**

In this study the main goal was to assess the effect of oral health on the severity of covid19 in those patients who were recovered from the disease by using the validated questionnaire. Guidelines used for assessment of severity of covid 19 were taken from the CDC, WHO, NHS and National Institute for Health^{9,10}. In covid 19 pandemic situations face to face examination was not possible hence the use of voice calls, video calls were suitable for this study. Increased concentration of bacteria like Fusobacterium, Prevotella and Staphylococcus were found in the oral cavity of the patients who suffer the severe form of covid 19¹¹. It was assumed that the mechanism responsible for this relation may be a)oral bacteria may get aspirated into the lungs¹² b)Colonization of respiratory pathogens may be enhanced by the enzymes released by the oral pathogens c)other factor is dental plaque which enhances the growth of respiratory pathogens¹³ d)immune response like cytokines may modify the respiratory epithelium and hence increase the chance of infection by respiratory pathogens¹⁴.

A study conducted by Wölfel et al. (2020) found that in the throat specimen SARS-CoV-2 was found in an appreciable concentration¹⁵. In addition to that various oral antiseptic rinses reduce the viral load by that way not

only decreasing the transmission but also the severity of the disease^{16,17}. In various studies it was found that the infectivity of SARS-CoV-2 depends on the penetration of virus that penetration is facilitated by the transmembrane protein angiotensin-converting enzyme 2 (ACE2) found on the cells of lungs, intestines, heart, kidneys as well as oral mucosa and salivary gland hence oral cavity behaves good reservoir for SARS-CoV-2¹⁸. The study was conducted by Yoon et al. (2020) in which he concluded that chlorhexidine mouthwash reduces the viral load in saliva¹⁹.

In this study it was found that in both first and second week of poor hygiene status was found in higher number of individuals than good hygiene individuals. 71% sensitivity and 80% specificity was calculated in this study in terms of impact of oral health on the COVID-19 severity. Hence this study makes the use of teledentistry as in situations like COVID-19 pandemic where face to face examination is not possible this is the only way for research.

Conclusion:-

By this study we can conclude that oral health no doubt may have impact on the COVID-19 severity. This type of study should be used at large scale before the clinical examination to reduce the dental exposure in such pandemic like situations.

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